

C L A I M S

What is claimed is:

1 1. A method for automatically detecting scene changes within a
2 digital video sequence including a succession of frames, comprising:

3 computing metrics for each of a plurality of frames from a digital
4 video sequence, the metric of a frame being a measure of distance between the
5 frame and a given frame;

6 identifying a candidate frame for which the metric of the
7 candidate frame differs from the metric of the predecessor frame to the candidate
8 frame, by at least a first threshold;

9 determining whether the metrics of successive ones of each of a
10 first plurality of frames, successively following the candidate frame, differ from
11 one another by less than a second threshold; and

12 further determining whether the metrics of each frame of a
13 second plurality of frames, successively preceding the candidate frame, are larger
14 than a third threshold.

15 2. The method of claim 1 wherein the measure of distance is based
16 on color histograms of frames.

17 3. The method of claim 2 wherein the measure of difference is a
18 sum of absolute values of differences of histogram frequencies.

19 4. The method of claim 2 wherein the measure of difference is a
20 sum of squares of differences of histogram frequencies.

21 5. The method of claim 1 further comprising marking the candidate
22 frame as a scene change frame, when said determining determines that the metrics
23 of successive ones of each of the first plurality of frames differ from one another
24 by less than the second threshold, and when said further determining determines
25 that the metrics of each frame of the second plurality of frames are larger than the
26 third threshold.

6. The method of claim 5 wherein said marking does not mark the candidate frame as a scene change frame if a frame preceding the candidate frame is substantially similar to the current frame.

7. A system for automatically detecting scene changes within a digital video sequence including a succession of frames, comprising:

a processor computing metrics for each of a plurality of frames from a digital video sequence, the metric of a frame being a measure of distance between the frame and a given frame;

a frame identifier identifying a candidate frame for which the metric of the candidate frame differs from the metric of the predecessor frame to the candidate frame, by at least a first threshold; and

a comparator determining whether the metrics of successive ones of each of a first plurality of frames, successively following the candidate frame, differ from one another by less than a second threshold, and determining whether the metrics of each frame of a second plurality of frames, successively preceding the candidate frame, are larger than a third threshold.

8. The system of claim 7 wherein the measure of distance is based on color histograms of frames.

9. The system of claim 8 wherein the measure of distance is a sum of absolute values of differences of histogram frequencies.

10. The system of claim 8 wherein the measure of distance is a sum of squares of differences of histogram frequencies.

11. The system of claim 6 further comprising a scene change marker marking the candidate frame as a scene change frame, when said comparator determines that the metrics of successive ones of each of the first plurality of frames differ from one another by less than the second threshold, and that the metrics of each frame of the second plurality of frames are larger than the third threshold.

1 12. The system of claim 11 wherein said scene change marker does
2 not mark the candidate frame as a scene change frame if a frame preceding the
3 candidate frame is substantially similar to the current frame.

1 13. A method for automatically detecting scene changes within a
2 digital video sequence including a succession of frames, comprising:

3 computing metrics for each of a plurality of frames from a digital
4 video sequence, the metric of a frame being a measure of distance between the
5 frame and an initial frame;

6 identifying a candidate frame for which the metric of the
7 candidate frame differs from the metric of the predecessor frame to the candidate
8 frame, by at least a first threshold;

9 determining whether the metrics of successive ones of each of a
10 first plurality of frames, successively preceding the candidate frame, differ from
11 one another by less than a second threshold;

12 further determining whether the metrics of each frame of a
13 second plurality of frames, successively following the candidate frame, are larger
14 than a third threshold.

15 14. The method of claim 13 wherein the measure of distance is based
16 on color histograms of frames.

17 15. The method of claim 14 wherein the measure of difference is a
18 sum of absolute values of differences of histogram frequencies.

19 16. The method of claim 15 wherein the measure of difference is a
20 sum of squares of differences of histogram frequencies.

21 17. The method of claim 13 further comprising marking the
22 candidate frame as a scene change frame, when said determining determines that
23 the metrics of successive ones of each of the first plurality of frames differ from
24 one another by less than the second threshold, and when said further determining
25 determines that the metrics of each frame of the second plurality of frames are
26 larger than the third threshold.

1 18. The method of claim 17 wherein said marking does not mark the
2 candidate frame as a scene change frame if a frame following the candidate frame
3 is substantially similar to the initial frame.

1 19. A system for automatically detecting scene changes within a
2 digital video sequence including a succession of frames, comprising:

3 a processor computing metrics for each of a plurality of video
4 frames from a digital video sequence, the metric of a video frame being a measure
5 of distance between the video frame and an initial frame;

6 a frame identifier identifying a candidate frame for which the
7 metric of the candidate frame differs from the metric of the predecessor frame to
8 the candidate frame, by at least a first threshold; and

9 a comparator determining whether the metrics of successive ones
10 of each of a first plurality of frames, successively preceding the candidate frame,
11 differ from one another by less than a second threshold, and determining whether
12 the metrics of each frame of a second plurality of frames, successively following
13 the candidate frame, are larger than a third threshold.

14 20. The system of claim 19 wherein the measure of distance is based
15 on color histograms of frames.

16 21. The system of claim 20 wherein the measure of distance is a sum
17 of absolute values of differences of histogram frequencies.

18 22. The system of claim 21 wherein the measure of distance is a sum
19 of squares of differences of histogram frequencies.

20 23. The system of claim 19 further comprising a scene change
21 marker marking the candidate frame as a scene change frame, when said
22 comparator determines that the metrics of successive ones of each of the first
23 plurality of frames differ from one another by less than the second threshold, and
24 that the metrics of each frame of the second plurality of frames are larger than the
25 third threshold.

1 24. The system of claim 23 wherein said scene change marker does
2 not mark the candidate frame as a scene change frame if a frame preceding the
3 candidate frame is substantially similar to the initial frame.

1 25. A method for automatically detecting scene changes within a
2 digital video sequence including a succession of frames, comprising:

3 identifying a candidate frame that differs substantially from the
4 predecessor frame to the candidate frame;

5 determining whether a first plurality of frames, successively
6 following the candidate frame, are substantially similar to one another;

7 further determining whether each of a second plurality of frames,
8 successively preceding the candidate frame, differ substantially from a given
9 frame, wherein the given frame follows the first plurality of frames.

1 26. The method of claim 25 further comprising marking the
2 candidate frame as a scene change frame, when said determining determines that
3 the first plurality of frames are substantially similar to one another, and when said
4 further determining determines that each of the second plurality of frames differs
5 substantially from a current frame.

1 27. The method of claim 26 wherein said marking does not mark the
2 candidate frame as a scene change frame if a frame preceding the candidate frame
3 is substantially similar to the current frame.

1 28. A system for automatically detecting scene changes within a
2 digital video sequence including a succession of frames, comprising:

3 a frame identifier identifying a candidate frame that differs
4 substantially from the predecessor frame to the candidate frame; and

5 a comparator determining whether a first plurality of frames,
6 successively following the candidate frame, are substantially similar to one
7 another, and determining whether each of a second plurality of frames,
8 successively preceding the candidate frame, differs substantially from a given
9 frame, wherein the given frame follows the first plurality of frames.

1 29. The system of claim 28 further comprising a scene change
2 marker marking the candidate frame as a scene change frame, when said
3 comparator determines that the first plurality of frames are substantially similar to
4 one another, and that each of the second plurality of frames differ substantially
5 from the given frame.

1 30. The system of claim 29 wherein said scene change marker does
2 not mark the candidate frame as a scene change frame if a frame preceding the
3 candidate frame is substantially similar to the given frame.

1 31. A method for automatically detecting scene changes within a
2 digital video sequence including a succession of frames, comprising:

3 identifying a candidate frame that differs substantially from the
4 predecessor frame to the candidate frame;

5 determining whether a first plurality of frames, successively
6 preceding the candidate frame, are substantially similar to one another;

7 further determining whether each of a second plurality of frames,
8 successively following the candidate frame, differs substantially from an initial
9 frame, wherein the initial frame precedes the first plurality of frames.

1 32. The method of claim 31 further comprising marking the
2 candidate frame as a scene change frame, when said determining determines that
3 the first plurality of frames are substantially similar to one another, and when said
4 further determining determines that each of the second plurality of frames differ
5 substantially from the initial frame.

1 33. The method of claim 32 wherein said marking does not mark the
2 candidate frame as a scene change frame if a frame following the candidate frame
3 is substantially similar to the initial frame.

1 34. A system for automatically detecting scene changes within a
2 digital video sequence including a succession of frames, comprising:

3 a frame identifier identifying a candidate frame that differs
4 substantially from the predecessor frame to the candidate frame; and

5 a comparator determining whether a first plurality of frames,
6 successively preceding the candidate frame, are substantially similar to one
7 another, and determining whether each of a second plurality of frames,
8 successively following the candidate frame, differs substantially from an initial
9 frame, wherein the initial frame precedes the first plurality of frames.

1 35. The system of claim 34 further comprising a scene change
2 marker marking the candidate frame as a scene change frame, when said
3 comparator determines that the first plurality of frames are substantially similar to
4 one another, and that each of the second plurality of frames differs substantially
5 from the initial frame.

1 36. The system of claim 35 wherein said scene change marker does
2 not mark the candidate frame as a scene change frame if a frame preceding the
3 candidate frame is substantially similar to the initial frame.